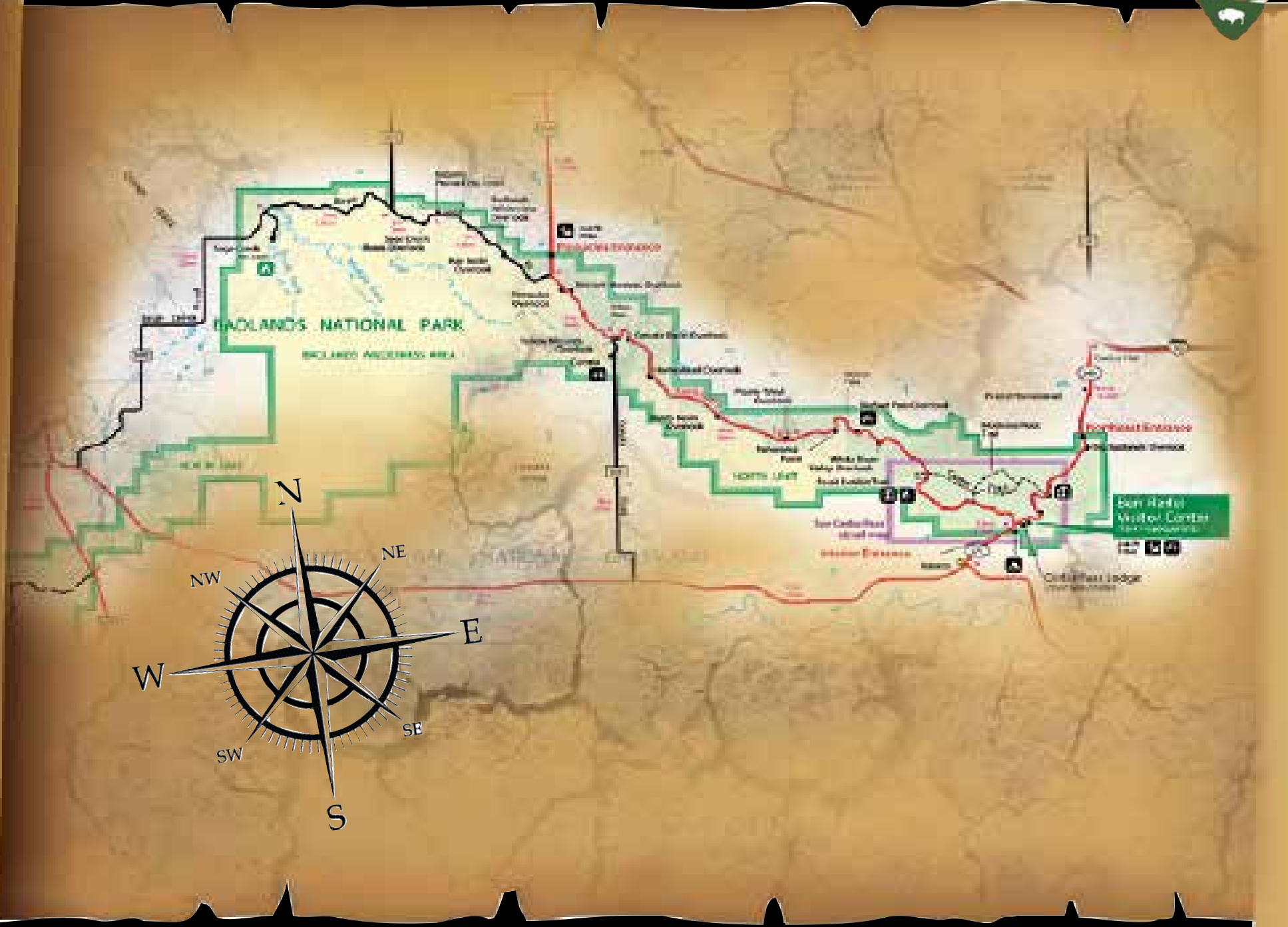
# Badlands

National Park Service
U.S. Department of the Interior




## GPS Adventure Activity Book

# Welcome to Badlands National Park!

## Get ready for an adventure to get out and explore the park up close and personal.

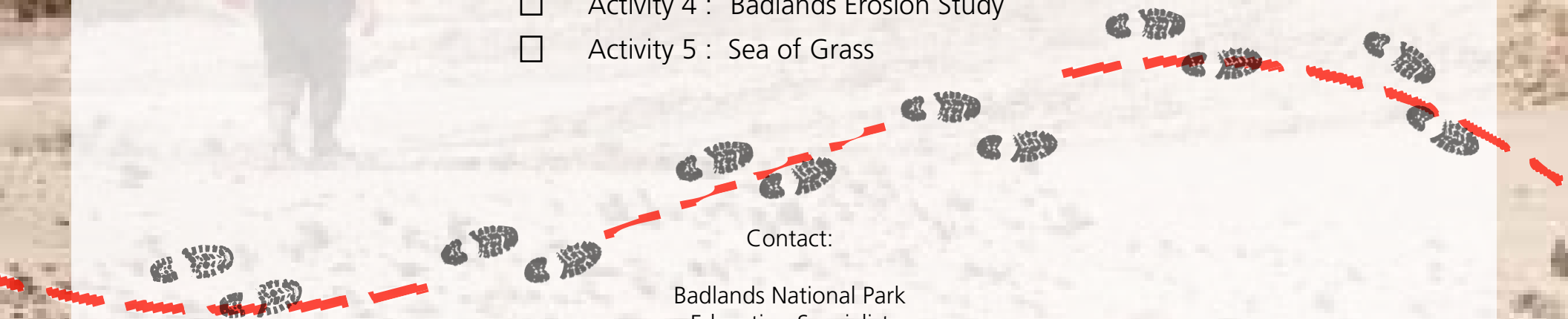
What you'll need:

- Device that navigates to GPS coordinates. This GPS activity uses the coordinate system WGS84. Make sure your system is set to WGS84.
- Device that gives your current elevation
- Pen/Pencil
- Tape measure/Ruler

What you'll receive:

- All individuals who complete a minimum of three activities will be rewarded with a patch.
- To claim your reward, submit your completed activities to the contact below or drop it off at the Ben Reifel Visitor Center

- ☐ Activity 1 : Living on the Edge
- ☐ Activity 2 : Oasis
- ☐ Activity 3 : Saber Site
- ☐ Activity 4 : Badlands Erosion Study
- ☐ Activity 5 : Sea of Grass



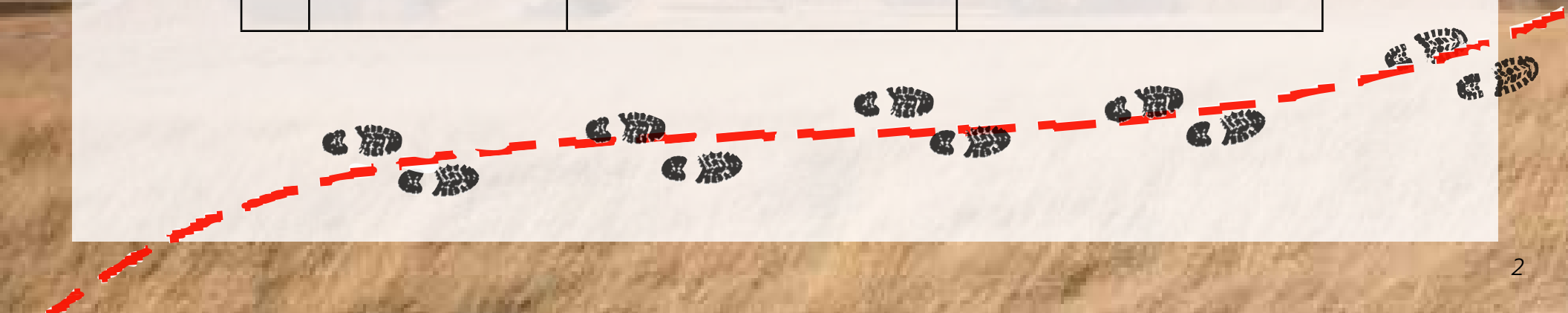
Contact:

Badlands National Park
Education Specialist
PO Box 6
Interior, SD 57750
BADL_Education_Specialist@nps.gov

# Up & Down

Record the site name and elevation at all 5 GPS adventure activity destinations.

| | GPS Coordinates | Site Name | Elevation |
|---|---|---|---|
| 1 | N 43.45.604<br>W 101.55.691 | | |
| 2 | N 43.45.028<br>W 101.55.864 | | |
| 3 | N 43.44.964<br>W 101.56.451 | | |
| 4 | N 43.44.952<br>W 101.56.505 | | |
| 5 | N 43.45.983<br>W 101.56.682 | | |



# Activity 1: Living on the Edge

Directions: Navigate to N 43.45.604 W101.55.691
You will arrive at the start of a trail. Read the trail information and prepare for your hike.
Trail: _____

Many bird species nest in Badlands National Park. One that especially delights visitors is the cliff swallow. This square-tailed bird is about 6 inches long with an 11 inch wingspan. It has a dark steel-blue back and crown, cream-colored underside, reddish brown cheeks and throat, pale orange rump, and a white forehead. Male and female cliff swallows are similar in appearance.

Cliff swallows prefer to nest in protected cliff areas with nearby water sources and open flight areas. Male and female cliff swallows build gourd-shaped mud nests on vertical surfaces. They begin by dabbing a circle of mud onto a wall and then adding mud-pellets that they collect with their beaks. A typical nest contains 1200 mud pellets lined with grass and feathers. Cliff swallows are gregarious birds and usually nest in colonies.



There is a cliff swallow nesting colony located along this trail. Scan the tops of the formations for a cluster of cantaloupe sized mud nests. You might hear the birds before you find their colony. A swallow's distinctive chirping call sounds like "cheat, cheat." You missed the nesting colony if you have to climb a ladder.

Use your GPS unit to mark the location where you first spotted the nesting colony.
Count or estimate the number of mud nests that you see and take an elevation reading at your observation site.

**GPS Coordinates of nesting colony:**

**Number of mud nests:**

What other common badlands bird species did you see on your hike?

# Activity 2: Oasis

Directions: Navigate to N 43.45.028 W 101.55.864

You will arrive at the start of a trail. Read the trail information and prepare for your hike.

Trail: _____

As you hike this trail notice the difference in habitat. The trees in the juniper grove provide food and shelter to many birds, plants and animals. You may even notice a temperature drop if you enter the grove on a hot summer day. Why is it so different ? A geologic slump formed here when a large block of rock slipped down the rock face. The resulting bowl-like slump can hold more water and it drains slower than the surrouding badlands terrain. At the top of the trail you will come across talus, or shattered rock, piled up at the base of the cliff which reveals that this is a dynamic and ever changing environment. As water moves through this area it continues to erode the sediments and change the shape of the land.

Make sure to note any wildlife you see on your hike. On an average day in the Badlands you can take advantage of the expansive view from the overlook area (N 43.45.052 W 101.55.797). According to the wayside sign with the rhyming title, what do geologists call natural events like the one that formed Cliff Shelf?

What other common animal species did you see on your hike?

# Activity 3: Saber Site & Fossil Lab

## Directions: Navigate to N 43.44.964 W 101.56.451

## Where are you? _____

In the summer of 2010, seven year old Kylie discovered a fossil while participating in a junior ranger program at the visitor center. Kylie did the right thing. She left the fossil where she found it and reported her find to a ranger. The fossil was excavated by paleontologists and identified as a *Hoplophoneus*, or saber tooth cat, skull. This mountain lion sized saber tooth cat lived in the Badlands over 30 million years ago. Each year nearly one million visitors come to Badlands National Park. Visitor fossil reports can lead to great scientific discoveries. We encourage you to keep your eyes openas you travel throughout the park and watch for the next big find.

Take a few minutes to check out the Saber Site, located directly behind the picnic area at the visitor center. Look closely and see if you can find any micro fossils around the area. Our paleontologists have found many different species in this small area! If you visit in the summer, you may see the paleontologists at work excavating the Saber Site fossil quarry.

Do you think you might have found a fossil in the park? Something like a bone, tooth or perhaps a tiny hackberry seed? Draw a picture of what you have seen while hunting for fossils. If you find a fossil report to the visitor center with your information and fill out a visitor report. Collecting in the park is illegal and punishable by a fine and/or imprisonment.

For updates on the Saber Site scan this code or go to www.go.nps.gov/fossil-lab

# Activity 4: Badlands Erosion Study

## Directions: Navigate to N 43.44.952 W 101.56.505

## How quickly are the Badlands formations disappearing? You can help answer this question by participating in the Badlands Erosion Study.

In July 2011, four erosion markers were placed in the formations across from the visitor center. Use the GPS coordinates to locate the markers. Measure the distance from the top of the marker to the lowest point on the ground at the marker. The top of the marker is curved, so use a flat edge to help you get a good measurement. When you compare your measurement with the one taken on July 10, 2011 you will get a better understanding of just how fast the Badlands are eroding.

| Erosion Marker # | GPS Coordinates | Distance from top of marker to lowest point on ground July 10, 2011 | Distance from top of mark-er to lowest point on ground Date:_____ |
|---|---|---|---|
| 1 | N 43.45.075<br>W 101.56.598 | 19 and 1/2 inches | |
| 2 | N 43.45.175<br>W 101.56.661 | 20 and 1/8 inches | |
| 3 | N 43.45.214<br>W 101.56.629<br>(Lower Marker) | 19 and 1/4 inches | |

Questions to Ponder and Discuss:

1. Suppose Marker #1 is placed in a formation that is 30 feet tall. How long do you think it would take for the entire formation to erode?

2. Badlands National Park receives approximately 13 inches of precipitation each year. What would happen to the erosion rate if annual precipitation increased?

3. Carefully examine the sediments layers in the Badlands formations. Notice how the layers are composed of different sediment types. Describe the sediment layer that appears to be eroding the fastest. Describe the sediment layer that appears to be eroding the slowest.

# Activity 5: Sea of Grass

## Directions: Navigate to N 43.45.983 W 101.56.682

## Where are you? _____

Prairies are large, rolling expanses of grasses, flowers, and herbs. Pioneers who first saw these areas called them "grass seas." Tall grass prairies, mixed grass prairies, and short grass prairies are types of "grass sea" habitats located in North America. Each prairie type is associated with unique flora and fauna, soil chemistry, and annual precipitation.

Grass species can help identify the Badlands prairie type. You will study and measure grasses in different prairie locations in the park. By comparing your data to the information in the North American Prairies chart, you will determine the Badlands prairie type.

| North American Prairie Chart | Tall Grass Prairie | Mixed Grass Prairie | Short Grass Prairie |
|---|---|---|---|
| Dominant Grass Species | Big Bluestem<br>Indiangrass<br>Switchgrass<br>Cordgrass | Wheatgrass<br>Little Bluestem<br>Needlegrass | Blue Grama<br>Buffalo Grass<br>June Grass<br>Indian Ricegrass |
| Average Grass Height | 60 inches | 12-48 inches | 10 inches |
| Average yearly Precipitation | 30 inches | 13 inches | 8 inches |

Carefully study the vegetation around you. Measure the height of three different species of "tall" grass and three different species of "short" grass. Record and average your measurements. Compare your data to the information in the North American Prairies Chart to identify the park's type of prairie.

| | |
|---|---|
| Length of Tall Grass #1: _____inches | Length of Short Grass #1: _____in |
| Length of Tall Grass #2: _____inches | Length of Short Grass #1: _____in |
| Length of Tall Grass #3: _____inches | Length of Short Grass #1: _____in |
| Average Length of Tall Grass: _____in | Average Length of Short Grass: _____in |

Based upon your observations and measurements, what type of prairie habitat are you standing in? _____
(Consult the North American Prairies chart above.)

# *Congratulations!*

This certifies that

_____

has fulfilled the requirements to complete the

## GPS ADVENTURE

at Badlands National Park

on this,

the _____ day of _____, _____

_____

Park Ranger